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# IC adds full-duplex RS-485 operation

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The simple RS-485 repeater (Fig 1) provides full-duplex communications—simultaneous transmitting and receiving—with only two ICs. Its balanced and differential data lines battle high-noise environments and drive long lines. Single-ended RS-232C schemes cannot equal this circuit's performance.

The RS-485 standard allows for bidirectional, multipoint, party-line communications at data rates up to 10 Mbps (150 kbytes/sec) and line lengths to 1200m. To achieve data rates up to 2.5 Mbytes/sec, substitute the components in Table 1.

IC<sub>1</sub>, a half-duplex interface, includes transceivers, optocouplers, a power driver, and a transformer. The transformer couples power across the device's isolation barrier from its logic (nonisolated) side to its isolated side.

IC<sub>2</sub>, powered by the isolated V<sub>CC</sub>, upgrades the half-duplex operation of IC<sub>1</sub> to full duplex by using IC<sub>1</sub>'s dedicated opto-

TABLE 1—COMPONENTS NEEDED FOR DIFFERENT DATA RATES

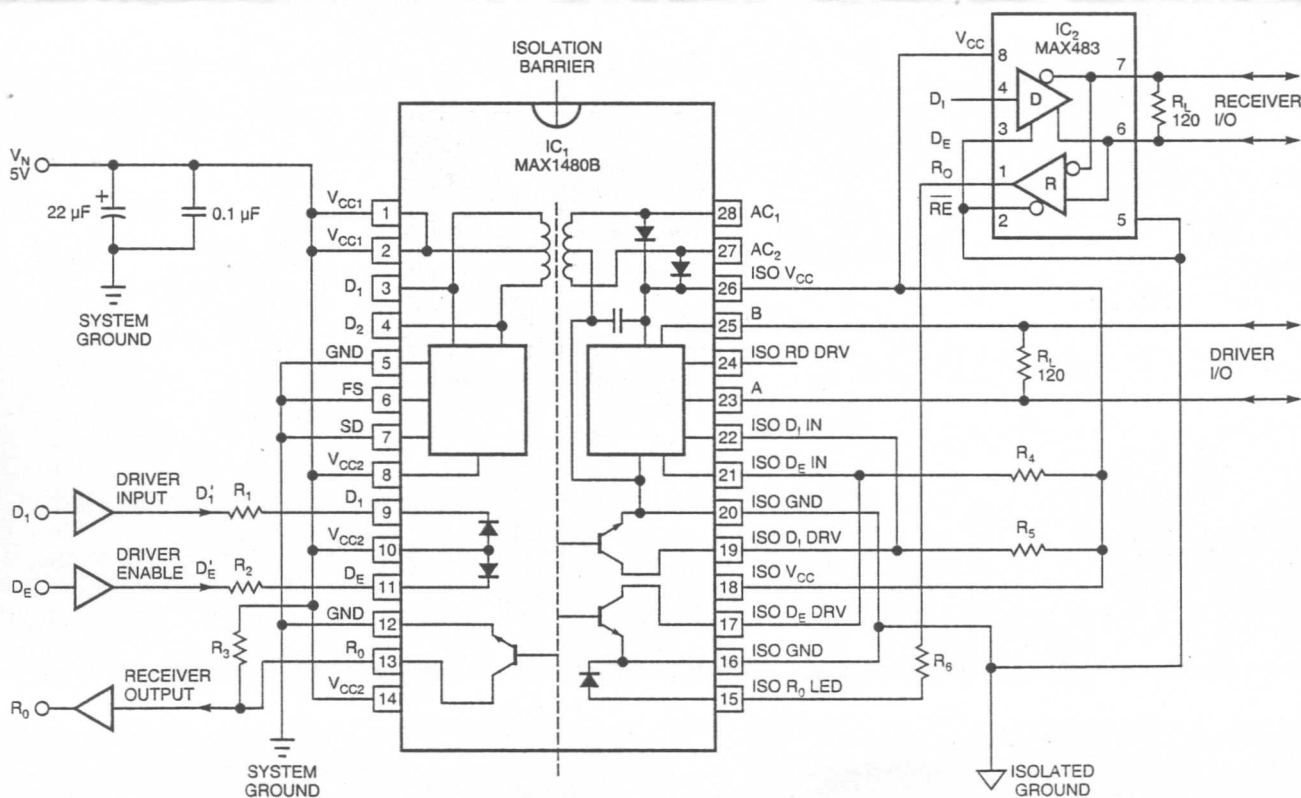
Data rates (bytes/sec)	IC <sub>2</sub>	IC <sub>3</sub>	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	R <sub>5</sub>	R <sub>6</sub>
2.5M	MAX1480A	MAX485	200	200	360	3k	360	200
250k	MAX1480B	MAX483	200	510	3k	2.2k	3k	200

couplers. You must tie IC<sub>2</sub>'s pin 3 low to disable IC<sub>1</sub>'s driver and leave pin 4 floating. The driver outputs of IC<sub>1</sub> and IC<sub>2</sub> exhibit high impedance when D<sub>E</sub> is low; bringing D<sub>E</sub> high enables the outputs to function as line drivers.

Any TTL/CMOS logic family can drive IC<sub>1</sub>'s digital inputs through a series resistor. With the aid of resistor pullups, the outputs can drive such loads as well. IC<sub>1</sub>'s isolated outputs meet all RS-485 specs. (DI #1613)

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FIGURE 1



Adding IC<sub>2</sub> to a half-duplex, RS-485 transceiver enables full-duplex operation.